We claim:

1. A method for computing Boolean set operations on two regions defined by quadtree-indexed vector representations of region boundary tuples, comprising the steps of:

classifying quadtree indexing cells for each region as either interior indexing cells that are interior to the region or boundary indexing cells that are partially inside and partially outside the region;

categorizing quadtree indexing cells that interact between the two regions as one from among the group including interior x interior, boundary x interior, or boundary x boundary;

defining pseudo points for each boundary x boundary indexing cells at which the region boundaries enter and exit that boundary indexing cell.

2. The method of claim 1, further comprising the step of categorizing each boundary x boundary indexing cell based on the peripheral ordering of pseudo points about that cell.

3. The method of claim 2, further comprising the step of selecting one of said regions and a boundary tuple thereof to begin collecting a tuple-based set operation product, said selection being based on said boundary x boundary indexing cell categorization.

4. The method of claim 3, further comprising the step of completing a set operation product for each boundary x boundary indexing cell by collecting tuple points along said starting region boundary until said boundary intersects that of the other region, and then accumulating tuple

points along the other region boundary, repeating the foregoing until the respective boundary x boundary indexing cell has been traversed.

5. The method of claim 4, further comprising the step of combining the set operation products from all of said boundary x boundary indexing cells to yield a boundary x boundary indexing cell product.

6. The method of claim 5, further comprising the step of calculating an overall vector-based set operation by performing a set operation separately on the interior x interior and boundary x interior indexing cells, and combining the result with the boundary x boundary indexing cell product.

7. The method of claim 6, wherein said vector-based set operation is one from among the group of quad intersection and union.

8. The method of claim 7, further comprising the step of pre-testing that the two regions interact by some degree to ensure that the vector-based set operation is not a null solution.

9. An optimal method for computing the set operations for boundary x boundary indexing cell interactions between the borders of two regions, comprising the steps of:

defining pseudo points for each boundary x boundary indexing cell at which each region border enters and exits the respective boundary indexing cell;

categorizing each boundary x boundary indexing cell based on the ordering of pseudo points around that cell;

selecting a starting point for collecting a tuple-based set operation product based on said categorization;

collecting tuple points along said region borders in a predetermined sequence to complete set operation product for each boundary x boundary indexing cell;

combining the collected tuple points for all boundary x boundary indexing cells.

10. The method of claim 9, wherein said step of selecting a starting point further comprises selecting a starting region and boundary tuple thereof of one of said regions to begin collecting tuple points, said selection being based on said boundary x boundary indexing cell categorization.

11. The method of claim 10, wherein said step of collecting tuple points along said region borders in a predetermined sequence further comprises collecting tuple points along said starting region boundary until said boundary intersects that of the other region, and then accumulating tuple points along the other region boundary, and repeating the foregoing until the respective boundary x boundary indexing cell has been traversed.

12. The method of claim 11, wherein said step of categorizing each boundary x boundary indexing cell is based on any one of six possible orderings of pseudo points occurring around that cell.

13. A method for computing Boolean set operations on two regions defined by a quadtree-indexed vector representation of data point tuples, comprising the steps of:

establishing quadtree indexing cells about said two regions;

establishing all boundary x boundary indexing cells which contain a portion of the boundaries of both of said regions;

defining pseudo points for each boundary x boundary indexing cell at which the boundaries of said two regions enter and exit the boundary x boundary indexing cell;

categorizing each boundary x boundary indexing cell based on a relationship of said pseudo points;

selecting one of said two regions to be a starting region based on said categorization;

calculating a set operation by forming a list of tuples encountered while following the starting region through the boundary x boundary indexing cell until an intersection of the boundaries of said two regions occurs, and then accumulating tuples associated with the other of said region.

14. The method of claim 13, wherein said step of selecting one of said two regions to be a starting region further comprises selecting a starting region and boundary tuple thereof to begin collecting tuple points, said selection being based on said boundary x boundary indexing cell categorization.

15. The method of claim 14, wherein said step of calculating a set operation by forming a list of tuples is repeated until the respective boundary x boundary indexing cell has been traversed.

16. The method of claim 14, wherein said step of categorizing each boundary x boundary indexing cell is based on any one of six possible orderings of pseudo points occurring around that boundary x boundary indexing cell.

17. A method for computing Boolean set operations on two regions defined by a quadtree-indexed vector representation of data point tuples, comprising the steps of:

establishing indexing cells about said two regions;

distinguishing Interior x Interior indexing cells containing overlapping interior cells of both regions, Interior x Boundary indexing cells containing interior cells of one region and a portion of a boundary of the other regions, and Boundary x Boundary indexing cells which contain a portion of the boundaries of both of said regions;

defining pseudo points for each Boundary x Boundary indexing cell at which said two regions enter and exit the boundary indexing cell;

categorizing each Boundary x Boundary indexing cell based on a relationship of said pseudo points, and selecting one of said two regions to be a starting region for that indexing cell based on said categorization;

calculating a set operation by forming a list of tuples in each Boundary x Boundary indexing cell that are encountered while tracing the boundary of the starting region until it intersects the boundary of the other region, and then accumulating tuples encountered while tracing the boundary of the other region.

18. The method of claim 17, further comprising the step of combining the set operation products from all of said boundary x boundary indexing cells to yield a boundary x boundary indexing cell product.

19. The method of claim 18, further comprising the step of calculating an overall vector-based set operation by performing a set operation separately on the interior x interior and boundary x interior indexing cells, and combining the result with the boundary x boundary indexing cell product.

20. The method of claim 19, wherein said vector-based set operation is one from among the group of quad intersection and union.